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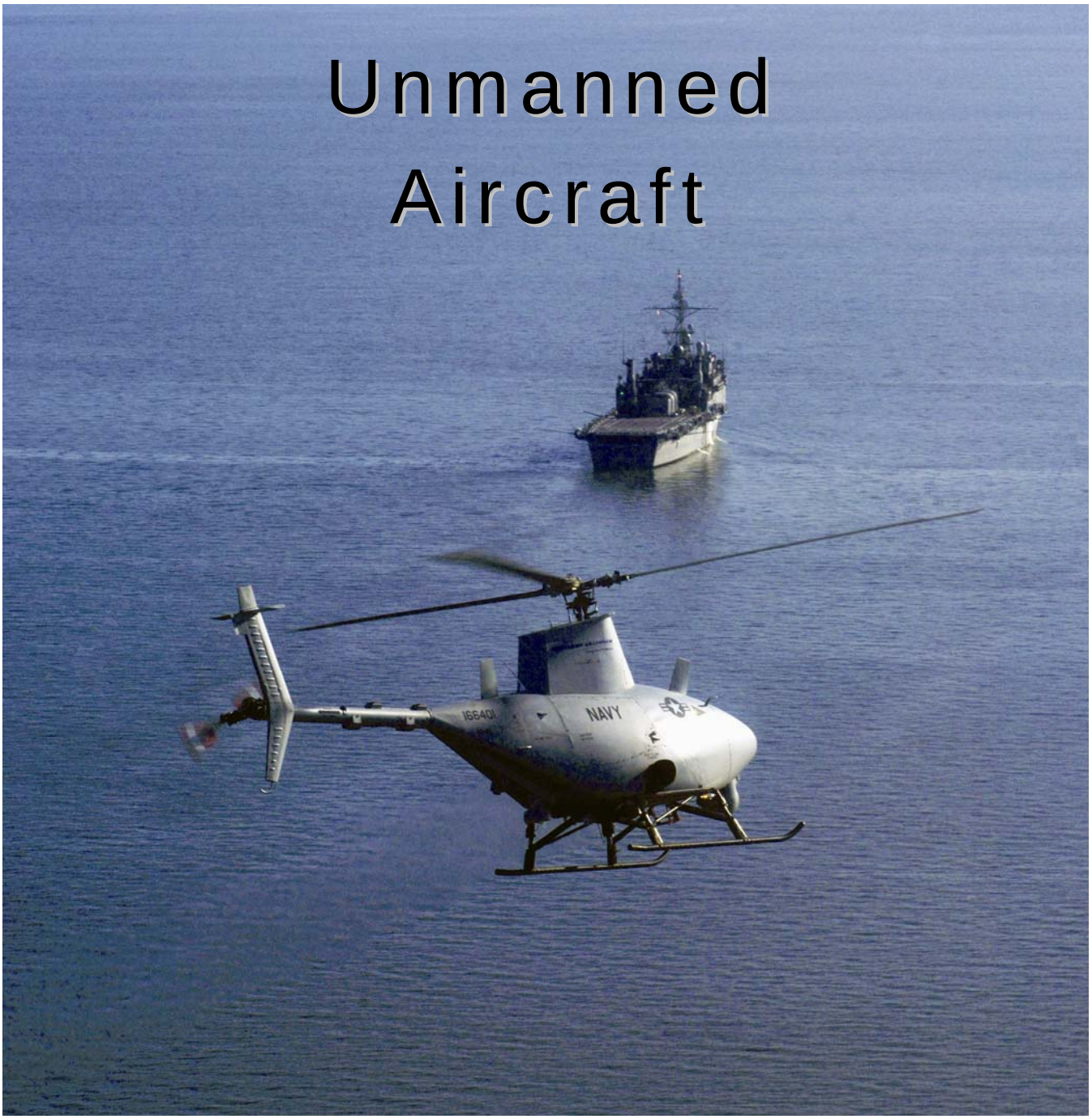

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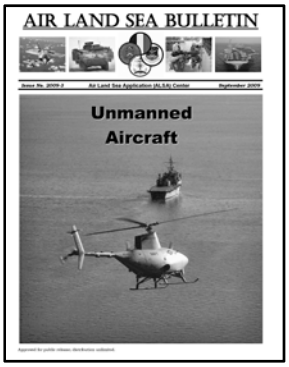

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Purpose: ALSA Center publishes the *ALSB* three times a year. ALSA is a multi-Service DOD field agency sponsored by the U.S. Army Training and Doctrine Command (TRADOC), Marine Corps Combat Development Command (MCCDC), Navy Warfare Development Command (NWDC), and Curtis E. LeMay Center for Doctrine Development and Education (LeMay Center). This periodical is governed by Army Regulation 25-30, Chapter 10. The ALSB is a vehicle to "spread the word" on recent developments in warfighting concepts, issues, and Service interoperability. The intent is to provide a cross-Service flow of information among readers around the globe. **Disclaimer: Since the ALSB is an open forum, the articles, letters, and opinions expressed or implied herein should not be construed to be the official position of TRADOC, MCCDC, NWDC, Lemay Center, or ALSA Center.**

Submissions: We solicit articles and reader's comments. Contributions of 1,500 words or less are ideal. Submit contributions, double-spaced in MS Word. Include name, title, complete unit address, telephone numbers, and e-mail address. Graphics can appear in an article, but you must also provide a **separate computer file for each graphic and photograph (photos must be 300 dpi)**. Send e-mail submissions to alsadirector@langley.af.mil. ALSA Center reserves the right to edit content to meet space limitations and conform to the *ALSB* style and format. **Next issue: January 2010. Submission DEADLINE: COB 1 November 2009.** Theme of this issue is "irregular warfare."

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IN HOUSE

FEATURE ARTICLES

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Cover photo — A RQ-8A Fire Scout Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle (VTUAV) System prepares to land aboard the amphibious transport dock ship *USS Nashville*. (Photo by Kurt Lengfield,USN)

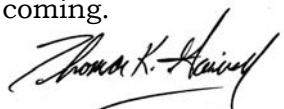
Director's Comments

The mission of the Air Land Sea Application (ALSA) Center is to rapidly develop multi-Service tactics, techniques, and procedures (MTTP) to meet the immediate needs of the warfighter. We are committed to solving interoperability problems for the Soldiers, Sailors, Airmen, Marines, and Coast Guardsmen who live and fight at the tactical level of war; and the purpose of the Air Land Sea Bulletin (ALSB) is to provide a forum for warfighters to discuss "what worked" and "what needs to get fixed." Currently, we have 12 active projects in various phases of development with 6 additional publications going into research for revision later this year. Right now, look for the newly developed MTTP publications on *Integrated Air Defense (IADS), Tactical Convoy Operations (TCO), Peace Operations, and Airspace Control*. As always, you can download all of our pubs from the ALSA website or order them through your Service's publication distribution system. The theme for our January 2010 ALSB is "irregular warfare" with article submissions due 1 November 2009, and the theme for our May 2010 ALSB is "close air support (CAS)" with 1 March 2010 as the suspense for articles.

The theme of this ALSB is "unmanned aircraft (UA)," starting with tactical unmanned aircraft operations, lessons from the USAF Weapons School, and ending with the significant issues of integrating UA operations within the National Airspace Control System during training in the continental US. Our bulletin starts with Capt Mwesigwa who proposes multi-ship UA operations to increase their capability and more closely align with the standard formation employment of manned aircraft. Abe Sebastian provides an update on the latest Navy UA tactics, techniques, and procedures integrating small tactical UA with amphibious forces. He points out that while the focus of the Navy TTP is on Navy-Marine Corps operations, it is readily applicable to ships operating independently or as part of a carrier strike group. Maj Callahan brings a weapons school perspective that focuses on CAS savvy crews and the need to train them to perform tactical air coordinator (airborne) [TAC(A)] duties with the objective being a force multiplier to both the ground party as well as fellow CAS aircraft. Next, MAJ Filbert, Ms. Zeller, and Maj Bernier highlight the pitfalls of the ever increasing demand for full motion video without the corresponding increase in exploitation capability. They argue that the lack of joint exploitation training standards ultimately reduces the value of the information to the warfighter. Finally, Mr. Odom highlights the hurdles facing operational units integrating their organic UA into the national air control structure. He points out that these systems have become vital to military operations and that commanders will have a reasonable expectation to integrate and exercise with these systems once units return from overseas.

The summer turnover allows the ALSA Center to welcome our newest JASC member, BGen Walter Miller, Jr., Director, Capabilities Development Directorate of the Marine Corps Combat Development Command, replacing BGen Andrew O'Donnell. We also welcome USAF Col David Hume, former 4th Air Support Operations Group Commander, Heidelberg, Germany, as our new Director and Maj Ray Zuniga, our most recent graduate of Air Command and Staff College, Maxwell AFB, Alabama.

On a personal note, this will be my last ALSA bulletin as ALSA Director, as I execute a short notice move to the George C. Marshall European Center for Security Studies in Garmisch-Partenkirchen, Germany. The time I have spent at ALSA has been entirely too short as I have witnessed the continuing evolution in joint operations with multi-Service tactics, techniques, and procedures. As I reflect on this unmanned aircraft issue, the words of General Omar Bradley come to mind, "If we continue to develop our technology without wisdom or prudence, our servant may prove to be our executioner." As always, we rely on the warfighting community for ideas and expertise in identifying and solving interoperability problems or doctrinal voids between the Services. Thank you and keep'em coming.



Thomas K. Gainey
Colonel, USA
Director

Predator and Reaper Advancement in Combat Capabilities

An armed MQ-9 Reaper unmanned aircraft taxis down a runway in Afghanistan. A Reaper released several guided bomb unit-12s on possible improvised explosive devices located in a roadway near Qalat. (Photo by SSgt Brian Ferguson, USAF)

By
Capt Steven Mwesigwa, USAF

The Predator and Reaper bring to the fight persistent full motion video (FMV) over the battlefield for troops on the ground and other airborne assets.

As operations in Operation IRAQI FREEDOM (OIF) and Operation ENDURING FREEDOM (OEF) continue, the roles of the MQ-1 (Predator) and MQ-9 (Reaper) continue to expand at a near-exponential rate. The Predator and Reaper bring to the fight persistent full motion video (FMV) over the battlefield supporting both troops on the ground and other airborne assets. These aircraft have a critical capability to loiter up to 20 hours. The Predator carries the AGM-114 Hellfire precision strike missile, and the Reaper carries the Hellfire and GBU-12 Paveway II 500 lb precision guided bomb. These weapons, along with their targeting pod, give the Predator and Reaper the precision strike ability to engage the enemy. Currently, the capabilities of these unmanned aircrafts (UAs) are usually restricted to single ship missions with the occasional opportunity to aid other manned aircraft in buddy lase and/or talk-on situations. UAs have begun expanding their abilities allowing for not only improved effectiveness of the Predator and Reaper but also for better integration with other air assets. These UAs are being used in intelligence, surveillance, and reconnaissance (ISR); close air support (CAS); and combat search and rescue (CSAR) roles on a 24/7 basis. Unfortunately, as the combat capabilities of these UAs rapidly expand within the community, their capabilities are not well known to other air and ground assets operating within the operational area.

As mission demands in the operational area expand, the newest change has been multi-ship employment. The multi-ship formation allows the UAs to provide FMV from multiple views and allows engage-

ment of multiple ground targets with precision guidance and simultaneous impacts. One of the limitations of the Predator and Reaper has been the inability to fly visual formation. This handicap has been overcome by using systems available to the pilots on the ground to assist the UA in flying multi-ship formations to provide mutual support that greatly increases the strike effectiveness of the mission.

Another limitation with a single ship Predator or Reaper is that it is restricted to employing its weapons one at a time with no ability to instantly employ against two or more targets. With mutual support, the Reaper, which can carry up to 4 GBU-12 bombs or 2 GBU-12s and 4 Hellfire missiles, gains the ability to employ against multiple targets on the ground with guidance provided by the other Predator or Reaper aircraft in the formation.

The primary deconfliction method used by the Predator and Reaper is altitude separation. With aircraft separation assured, there are multiple techniques used by the pilot to position themselves for buddy lase employment scenarios. Additionally, these aircraft can employ weapons from their own aircraft aiming for simultaneous impacts on separate ground targets. Using timing techniques, each UA pilot has the ability to position the UA and employ weapons with the goal of simultaneous impact. Based upon missile /bomb time of fall, available airspace, and altitude, the UA can be controlled to maintain a weapons engagement zone (WEZ) and release its weapons to create synergistic effects on the ground that cannot be duplicated by a single Predator or Reaper attacking a ground target. The use of Predators and Reapers in this new multi-ship environment has broadened the lethal effectiveness of the UA and continues to help align these systems with the lethal capability of traditional manned assets in theater.

An MQ-1 Predator takes off during the first operational test of the latest upgrade to the Predator. (Photo by MSgt Rob Valenca, USAF)

The massive increase in lethality with multi-ship formations cannot be overstated. The Predator and Reaper now have the ability to take on tasks that would be impossible in a single ship scenario. Typical single ship UA missions include improvised explosive device (IED) hunting, car chases, convoy escort, and constant surveillance of static targets. Once you add two, three, or even four UAs into one scenario, Predators and Reapers gain the ability to engage multiple enemy personnel in different locations and take out large buildings or compounds with multiple desired points of impact (DPI) simultaneously if needed. Furthermore, in their classic role, these UAs can improve their ability to maintain sight of vehicles during car chases in congested areas, provide different look angles of static targets, and aid troops on the ground with more FMV capability.

The use of Predators and Reapers in this new multi-ship environment has broadened the lethal effectiveness of the UA and continues to help align these systems with the lethal capability of traditional manned assets in theater.

In situations where one aircraft is unable to engage specific ground targets based on onboard weapons or lack of weapons due to previous employments, many times the other UA will have the required weapons and can employ when needed to destroy enemy targets or personnel when successive attacks are required. The combination of additional UAs greatly increases the type and number of weapons on the scene so that target objectives can be met. Even after weapons are ex-

pended, a Predator or Reaper is able to remain on station due to its long loiter ability and can aid other UA in the formation in buddy lase situations. It is clear that the step forward towards multi-ship planning and execution has not only greatly increased the capability of the UA in theater today, but it has helped evolve the UA to more closely meet the standard formation employment abilities of manned assets.

USAF 46th Expeditionary Aerial Reconnaissance Squadron (EARS) Predator pilot, Capt John "Disco" Songer operates an individual Predator UA using a remote control system at Balad Air Base, Iraq, in support of Operation IRAQI FREEDOM. (Photo by SSgt Cohen A. Young, USAF)

The role of the Predator and Reaper in current operations is going to continue to grow, a growth that is vital for future operations.

Recently there has been a slight increase in UA and manned aircraft training integration, and the future of the Predator and Reaper will most definitely include integration in multi-mission design series (MDS) scenarios. Predators and Reapers can refine their multi-ship techniques, and with the addition of newer technologies that may include Link-16, expanded pilot field of view, and newer weapons (such as the laser Joint Direct Attack Munition [JDAM]), the UA community must take the next step in its combat maturation and start to work with and fly with manned assets in the current theater and, more importantly, in future operations. Such integration is currently taking place in the 26th Weapons Squadron in the USAF Weapons School. The ability of the Predator and Reaper community to expand their new capabilities, especially with respect to multi-ship formation and multi-ship engagements, will only help with their eventual transition into much bigger multi-force exercises and operations.

The role of the Predator and Reaper in current operations continues to grow, a growth that is vital for future operations. Currently this growth includes improving upon current Predator and Reaper tactics and techniques as well as upgrading software to reflect new weapons coming online. The use of multi-ship formations has greatly multiplied the combat capability of Predator and Reaper operations; has strengthened current ISR, CAS, and CSAR missions; and more importantly, has increased the ability of Predators and Reapers to engage multiple ground targets and larger buildings and compounds with the simultaneous impact ability. It has changed how these assets are viewed and it is making the UA much more of a killing system than just an intelligence and reconnaissance system. As these capabilities grow it is essential that these techniques are known to other warfighters in the air and on the ground so that these capabilities can be called upon and used when needed.

Small Tactical Unmanned Aircraft Systems: New Fleet Tactics

A Scan Eagle unmanned aircraft is launched from a MK V naval special warfare boat. This is the first time a Scan Eagle, used for various applications such as intelligence gathering and battle damage assessment, has been launched from this kind of platform. (Photo by Mass Communication Specialist 3rd Class Michelle L. Kapica, USN)

By
Mr. Jim "Abe" Sebastian

Unmanned aircraft systems (UASs) are arguably the most sought-after tools in any warfighter's toolbag; and the numbers and types of systems assisting friendly forces are growing daily. All too often, it seems, the procurement is successful and the warfighter ends up with a new gadget, but no clear idea on how to employ it safely and effectively in a tactical environment.

A number of small tactical UASs have been employed with various fleet units supporting deployed naval forces under the terms of an ongoing program which provides contracted / leased aircraft for intelligence, surveillance, and reconnaissance (ISR) services. Although the operators of these systems are skilled at what they do, they often have little idea of how the fleet operates, or what tactics, techniques, and procedures (TTP) are best suited for optimizing the effectiveness of small UASs at sea. As the Navy moves forward with its plans to have these systems flown by Sailors, the need for suitable TTP does not diminish. The Commander Third Fleet (C3F), working in conjunction with Tactical Air Control Group One (COMTACGRU ONE), has recently published the first set of fleet TTP under a tactics development program sponsored by Naval Warfare Development Command (NWDC).

As the Navy moves forward with its plans to have these systems flown by Sailors, the need for suitable TTP does not diminish.

C3F Tactical Memorandum (TACMEMO) 3-02.1-09, "Integration of Small Tactical Unmanned Aircraft Systems With Amphibious Forces," (4 May 09) is the first set of formal TTP to hit the fleet. Although tailored for the Navy-Marine Corps team operating smaller-sized Group

2-3 UAS[1] from the decks of amphibious ships or their escorting destroyers while conducting operations in the littoral, much of the material contained in the TACMEMO is readily applicable to ships operating UASs independently or as part of a carrier strike group (CSG) as well.

Chapter 1 of the TACMEMO introduces the reader to the document, providing some basic background information on how UASs work. It then describes the unique features of the maritime operating environment and describes some of the mission areas in which small tactical UASs can greatly assist amphibious forces. Chapter 2 delves more deeply into missions supporting maritime and amphibious operations, while chapter 3 devotes itself to targeting and fire support TTP. Chapter 4 discusses methods for deconflicting airspace. Chapter 5 offers a variety of mission planning recommendations for amphibious staffs to consider when integrating UASs into their mission sets.

The TACMEMO provides a step-by-step guide for incorporating UAS operations seamlessly into this process.

A Predator unmanned aircraft as it passes near the aircraft carrier *USS CARL VINSON* (CVN-70) during a simulated Navy reconnaissance flight. (DoD photo by PH3 Jeff Viano, USN)

Amphibious ready groups (ARGs) will typically operate Group 2-3 UASs (such as the Scan Eagle, one of the systems currently being provided through the ISR contract) from the decks of their amphibious transport dock (LPD) or landing ship dock (LSD) class ships, leaving the large deck amphibious assault ship (general purpose) (LHA) or amphibious assault ship (dock) (LHD) class free to operate manned aircraft. The TACMEMO provides a variety of TTP to aid the ARG commander as he conducts operations on the high seas, transits through restricted waters, and builds/maintains a continual picture of the shipping traffic operating in his vicinity. Figure 1 is an illustration from the TACMEMO depicting the techniques a small UAS could use to "rig" an unknown ship, providing real-time information for the ARG's sea combat commander.

The TACMEMO also discusses the services a small tactical UAS can provide for the Marine Expeditionary Unit (MEU) commander as he plans ship-to-shore and subsequent maneuver ashore for his landing forces. Amphibious operations are con-sidered the most complex type of military maneuver and require careful planning utilizing the Marine Corps Six Step Planning Process. The TACMEMO provides a step-by-step guide for incorporating UAS operations seamlessly into this process. Effective command, control, and deconfliction of amphibious airspace is the special purview of the Navy's Tactical Air Control Center (TACC).

The TACMEMO devotes an entire chapter to TACC's role in executing afloat UAS operations to include airspace design planning factors along with extensive checklists. One effective technique is to establish a temporary restricted operations zone (ROZ) around the launching ship and connecting this ROZ to a dedicated UAS Blanket Altitude, a region of airspace which TACC will keep clear of unnecessary air traffic, allowing the UAS to execute its mission with greatly reduced potential for mid-air collision. Figure 2 illustrates this concept, which is explained in great detail in chapter 4 of the TACMEMO.

C3F TACMEMO 3-02.1-09 is available at the Commander Third Fleet website (www.C3F.Navy.smil.mil, under the "N8/9 Directorate" head-

ing) and is also available at the Naval Warfare Development Command website (www.NWDC.Navy.smil.mil) at their SIPRNET Online Library. A limited number of copies are also available by contacting Tactical Air Control Group One directly at DSN 577-2572.

END NOTE

[1] As defined by the Joint UAS Center of Excellence (JUAS COE), Creech AFB NV.

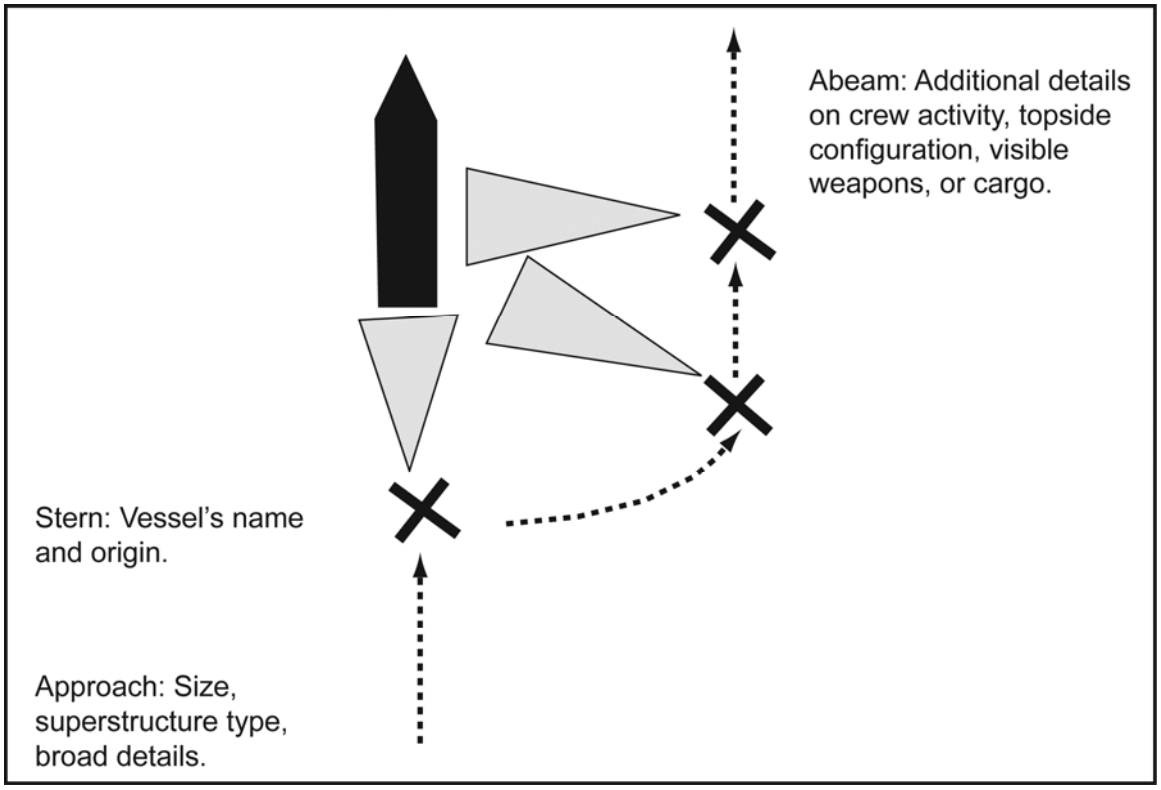


Figure 1. Quick Rig Technique

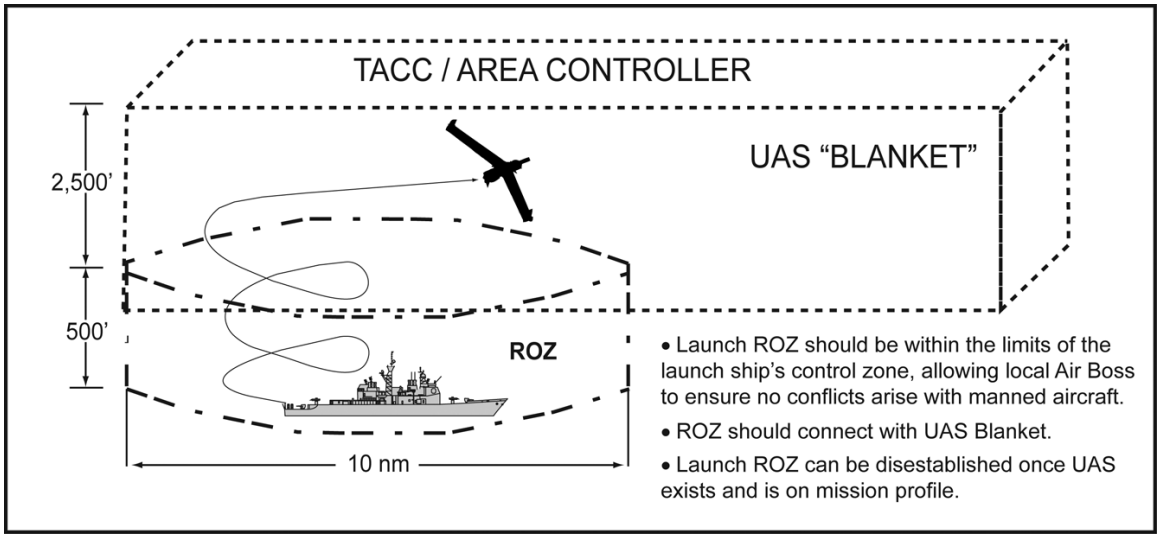


Figure 2. UAS Airspace Deconfliction Procedures

USAF Theater Unmanned Aircraft: Lessons Learned from the 26th Weapons Squadron, USAF Weapons School

An MQ-9 Reaper sensor shows a SCUD and a ROLAND surface-to-air missile system during exercises. (USAF Photo)

By
Maj Bryan "Squeeze" Callahan, USAF

Ask any tactical aviators where their legacy comes from and they will tell you; they are the descendants of trailblazers like Billy Mitchell and Frank Luke. They are the by-product of a generation of Airmen that saw the potential for aviation to contribute much more than simply spotting for indirect artillery. The pioneers of tactical aviation took the initiative to develop rudimentary formation tactics, some early bombing techniques, and the first air-to-air gunnery procedures.

The MQ-1/MQ-9 communities have a responsibility to advance the weapon system, and perhaps through these efforts they will earn the respect and acceptance of all.

Ask the same tactical aviators their opinion of the USAF's unmanned aircraft (UA) program and they will typically respond with begrudged acceptance. The full motion video (FMV) and intelligence collection capabilities of the MQ-1 Predator and MQ-9 Reaper are widely acknowledged and have become the standard throughout the Department of Defense (DOD)—from the smallest tactical operations center to the "E-ring" of the Pentagon. UAs have contributed greatly to prosecuting the enemy; however, the system's development thus far doesn't keep the faith with our legacy. The MQ-1/MQ-9 communities have a responsibility to advance the weapon system, and perhaps through these efforts they will earn the respect and acceptance of all. The unashamed thesis of this article is simple: UAs can and will redefine the manner by which airpower solves tactical problems. This transformation of multiple mission sets will be accomplished through direct and indirect integration of UAs. The objective of this article is to prove this thesis by highlighting the lessons learned during the UA's first

6 months at the USAF Weapons School.

MQ-1s are most often found performing intelligence, surveillance, and reconnaissance (ISR) taskings, while the MQ-9 is commonly found in the close air support (CAS) stack. These are well defined lanes for USAF UAs; however, the success of these mission sets does not exempt us from the need to define new roles and increase combat effectiveness. Strike, coordination, and reconnaissance (SCAR) and combat search and rescue (CSAR) are not as commonly known UA missions, but the potential to manage a Kill Box or to locate and protect a survivor is too great to ignore.

Both Predator and Reaper have electro-optical (EO) and infrared (IR) cameras with laser designators. (Photo courtesy of Bryan William Jones)

ISR has been the staple of USAF theater UAs since the platforms were first conceptualized, designed, and acquired. USAF UAs, along with our DOD counterparts, excel in this role. The sheer number of FMV hours, on target time, and subsequent tactical and strategic effects can only be described as incredible. Nonetheless, both the platforms conducting the mission as well as the fight itself have evolved. The need to properly define roles and field additional tactics, techniques, and procedures (TTP) has yet to be fulfilled. Two specific areas for enhancement are the roles of armed overwatch and armed reconnaissance.

Armed overwatch is a nontraditional function for airpower. Ground forces use this term to define the supporting element that will provide cover for a maneuver unit. The nature of the fight in Operation IRAQI FREEDOM (OIF) and Operation ENDURING FREEDOM (OEF) made aircraft a viable option to provide cover and act as the overwatch element. UAs excel in this role due to their ability to maintain overwatch for long periods while providing immediate intelligence to the maneuver unit through FMV. UAs do suffer from one inherent weakness that is particularly inhibiting when performing armed overwatch—"the soda straw affect." Unlike a manned aircraft, UAs lack the ability to look outside the canopy and gather the big picture. Being limited to one field of view at a time presents the UA pilot with a problem. Should the aircraft sensors be directed toward searching for the enemy or maintaining positive contact with the friendly ground force? The crew typically will default to time sharing between the two areas of interest, but in doing so will pay a penalty in situational awareness (SA).

Two UAs operating together can provide a ground force commander uninterrupted coverage of friendly forces for the entirety of an operation.

A potential solution is to employ UAs as a two-ship. The two-ship concept is not intended to employ formation tactics or provide for element mutual support. Instead, the two-ship concept allows for one crew to maintain overwatch of the friendly position, while the other crew searches the terrain at an appropriate distance to provide early warning and a potential kinetic response. This technique is particularly effective when tasked to support a convoy on the move or special operations forces that need rapid response to pop-up threats. Two UAs operating together can provide a ground force commander uninterrupted coverage of friendly forces for the entirety of an operation.

Armed reconnaissance is another mission set traditionally reserved for ground forces performing scouting functions in advance of a friendly operation. Like armed overwatch,

however, the nature of the conflict dictated the inclusion of aircraft into this mission. Airpower is often called upon to sweep a route ahead of a planned movement or provide sensor coverage on a target area prior to a raid—both of which are examples of armed reconnaissance. UAs have a distinct advantage in this role. The ability to remain undetected allows long duration collection from closer ranges than a manned aircraft could achieve due to noise signature. This ability has evolved into the practice of pushing the UAs closer to the target, while holding the manned aircraft outside the target area. Airpower remains in this posture until just moments before ground forces arrive on target, at which time manned aircraft are "cleared in."

The 26th Weapons Squadron's focus is to take CAS savvy crews and train them to perform tactical air coordinator (airborne) [TAC(A)] duties with the objective of being a force multiplier to both the ground party as well as fellow CAS aircraft.

During armed reconnaissance TTP development, the UA was quickly identified as the go-to platform to enhance all other players' SA. Under this concept of operations, the UA is the only aircraft on station when the ground forces arrive, and as such, is the only platform that has tracked the movement of both friendly and enemy forces as the ground situation goes dynamic. TTP development rapidly became focused on enabling the UA crew to act as a sensor allocation quarterback—directing follow on aircraft to track targets of interest, all the while preventing fratricide by providing timely and accurate picture calls on the present state of the ground situation.

MQ-1 and MQ-9 crews need to continue to improve training focused on performing this role, particularly as a two-ship working together to maximize sensor coverage. Given the appropriate tactical conditions, ground force commanders will be provided higher SA on target, more efficient sensor allocation, and an additional means of minimizing the risk of fratricide.

CAS training is commonplace for UA crews. Line pilots and sensor operators accumulate hundreds, and sometimes thousands, of combat support hours flying CAS missions during their UA assignment. The truth of the matter, however, is that UAs can provide much greater effects in the CAS fight by enhancing the capabilities of the other CAS players in the stack. This is a natural role for a platform that can stay with the ground force for the duration of the engagement, but has limited ordnance of its own. The 26th Weapons Squadron's focus is to take CAS savvy crews and train them to perform tactical air coordinator (airborne) [TAC(A)] duties with the objective of being a force multiplier to both the ground party as well as fellow CAS aircraft.

A USAF 46th Expeditionary Aerial Reconnaissance Squadron (EARS) Predator crew operates from Balad Air Base, Iraq, in support of Operation IRAQI FREEDOM. (Photo by SSGT Cohen A. Young, USAF)

JP 3-09.3, *Joint Tactics, Techniques, and Procedures for Close Air Support*, defines the TAC(A) as an aircraft that provides communications relay between the tactical air control party and attack aircraft, as well as other agencies of the tactical air control system, in the absence of airborne command and control aircraft or a forward air controller (airborne). The TAC(A) also expedites CAS aircraft-to-joint terminal attack controller (JTAC) handoff during "heavy traffic" CAS operations. UAs are able to provide such services, as well as provide a host of other capabilities that increase effectiveness and efficiency of all CAS players, due to a unique blend of reachback and presence.

The ROVER, a small laptop with an external antenna, allows the JTAC to see from the pilot's perspective. (Photo by SSgt. Angelique Perez, USAF)

SA to a UA pilot is different than that of the pilot of a manned aircraft. A manned aircraft can show up over the target and acquire a great deal of SA very rapidly. The pilot can accomplish this through the use of multiple radios, the ability to look outside the cockpit to get the big picture, through the availability of data-link systems, and often times, through the SA passed by a UA already on station. The UA pilot lags in the race to gain SA because of the lack of the aforementioned manned aircraft capabilities. To the UA's advantage, however, is duration. The UA frequently arrives on target before other aircraft, often because the UA was on station already conducting armed reconnaissance or overwatch. Additionally, the UA will remain on target longer than any other platform due to its loiter capabilities. Therefore, although the manned aircraft's SA will peak faster, a UA crew's SA is typically higher than aircraft that have recently arrived—simply because the UA has been there for hours. Furthermore, the UA's SA will remain high long after the manned aircraft clears off for fuel.

The MQ-1/MQ-9 TAC(A) would work in close concert with both the air support operations center (ASOC) and the JTAC responsible for attack clearance—acting as an airborne bridge between the scene of the engagement and the command and control organization tasking the appropriate aircraft. A well trained UA crew can assist the JTAC most profoundly by coordinating with other airborne players from an Airman's perspective. For example, an MQ-1 over the top of the target is in a much better position to provide a target talk on, because the crew of the UA shares the same perspective as the attacking aircraft. JTACs can follow the talk-on through the UA's FMV, and when the attacking crew positively identifies the target, a clearance can be issued without delay. Another example is in the deconfliction of air assets from surface-to-surface fires, weather, and one another. UA crews have tremendous capacity to plot airspace, determine gun-to-target lines, incorporate maximum ordnance of artillery, and understand the ramifications of nearby weather systems. The UA crew is, therefore, well equipped to hold other CAS players in optimum position to support the ground force.

The MQ-1/MQ-9 TAC(A) would work in close concert with both the air support operations center (ASOC) and the JTAC responsible for attack clearance—acting as an airborne bridge between the scene of the engagement and the command and control organization tasking the appropriate aircraft.

Another area where a UA crew can assist the JTAC is in alleviating the burden of weaponeering and attack coordination. An MQ-9 pilot acting as TAC(A) can work real time weaponeering solutions and pass the results to inbound attack aircraft—if not engaging the target directly. This includes passing single digit target location error (TLE) coordinates generated by the team of intelligence analysts and targeteers directly supporting the UA's operation. Lastly, MQ-1 and MQ-9s can leverage their reach-back capabilities to keep command and control and the ASOC informed of the status of the fight, allowing for improved asset allocation and higher headquarters awareness. UA sorties at the USAF

Weapons School focus on these skill sets, and training programs are being developed to bring line squadron crews up to the CAS TAC(A) standard.

CSAR operations are extremely complex missions that employ highly trained crews to attempt the difficult task of recovering isolated personnel from behind enemy lines. The mission calls for the close orchestration of a wide range of assets and the control of communications to ensure critical and accurate data is passed in a timely manner. The rescue forces of the CSAR mission are only able to execute their vital task after all of the preliminaries are resolved. This includes locating and authenticating the survivor; sanitizing the area to allow for rescue forces to approach; developing a solid communication plan; coordinating for additional strikers, tankers, and electronic warfare capabilities; and protecting the survivor until help arrives—all the while organizing a host of other effects-based capabilities to ensure success once the helo is on the ground. MQ-1s and MQ-9s have been used in this role both real world and in the crucible of the USAF Weapons School. All indications lead to one conclusion—a UA in the hands of a properly trained crew can be the difference between life and death for isolated personnel.

MQ-1 and MQ-9 are QUICKDRAW ready and can begin interrogating PRC-112 radios once the handset is plugged in.

A UA acting as the CSAR on scene commander (OSC) allows for a single point of contact for the duration of the CSAR mission. Whether that duration is composed of hours or days, a single squadron can keep aircraft overhead for as long as required. Therefore, none of the continuity gained through a single UA mission is lost once the aircraft returns to base. The UA is a perfect platform to locate the survivor. MQ-1 and MQ-9 are QUICKDRAW ready and can begin interrogating PRC-112 radios once the handset is plugged in. With the QUICKDRAW handset living at a central operating area, the unit can be transferred from ground control station (GCS) to GCS without any lapse in data collection. UAs also enjoy complete connectivity with the joint personnel recovery center and space assets to allow for rapid dissemination of combat survivor/evader locator data bursts. The UA community is well versed in tracking personnel and can employ these skills to track a survivor just as easily. Once located, the UA is unique in its ability to maintain overwatch while not highlighting the survivor's position—all the while passing critical location data back to the rescue elements. If the pickup is to be delayed, a UA is superb at providing long term bed down protection. The MQ-9 excels in this role due to its increased weapons load. In TTP development exercises, only the UA had the ability to remain eyes on the survivor, maintain a link between the immediate rescue area and the myriad of support agencies that sit beyond line of sight, coordinate between national and local agencies to keep the rescue elements informed, and provide kinetic effects if required.

This article highlights just some of the mission transformation opportunities. It's important to recognize that this transformation starts in how we view the tasking and employment of theater UAs and is enabled by how we train and equip our MQ-1 and MQ-9 crews.

If the first combat aviators accepted their day's mantra—aircraft were only to be employed by the Signal Corps—where would we be today? To ignore the potential impact of unmanned systems on the future of airpower would be tantamount to accepting a similar mantra—that the UA is an ISR only asset—and today's fight is as far as we can see. UAs can, and will, redefine the manner by which airpower solves tactical problems.

Exploitation of Unmanned Aircraft System Full Motion Video: Motion Imagery Exploitation Takes a Step Forward

In a still frame from video taken by the Scan Eagle unmanned aircraft, the guided-missile destroyer *USS Bainbridge* (DDG 96) is underway near a 28-foot lifeboat, lower right, from the US-flagged container ship *Maersk Alabama* in the Indian Ocean. (USN Photo)

By
MAJ Pat Filbert, USA,
Ms. Wendy Zeller, National Geospatial-Intelligence Agency,
and Maj Ray Bernier, USAF

BACKGROUND

In the 21st Century, United States (US) adversaries and battlegrounds have changed dramatically. The global war on terror has forced US leadership to rethink their military strategy from the previous century. The Commander, United States Joint Forces Command (USJFCOM), has emphasized the need for the US military to "be prepared to engage enemies in hybrid conditions"[1] by transforming its nonconventional means without sacrificing classic warfighting competence.

This view is driving new and innovative approaches to the intelligence collection processes that go well beyond traditional order of battle development. A premium is now placed on understanding cultural norms and pattern-of-life information of our adversaries. In this environment, motion imagery (MI) has become an indispensible tool to provide information supporting adversary actions.

The rapid emergence in the past decade of MI, which does not replace still imagery but is complementary, provides new opportunities for intelligence and situational awareness. However, while MI is proliferating, the requirement for better processes and training for the analysts exploiting MI is not keeping pace.

The Commander, United States Joint Forces Command (USJFCOM), has emphasized the need for the US military to "be prepared to engage enemies in hybrid conditions"…

Counterinsurgency (COIN) operations today have changed the formats for collecting intelligence, surveillance, and reconnaissance (ISR) information by rapidly expanding the use of MI. As often happens with technology, the increased capability of the equipment has exceeded the rate of change in some of the methods used to analyze the products, leading to gaps in training and operations.

In particular, imagery analyst training continues to focus on the essential skills of still imagery exploitation. This article addresses gaps in the field of MI exploitation, including the *absence of joint standards for MI analyst training* and the *lack of a common definition of the phases of MI exploitation*.

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VALUE OF MOTION IMAGERY

If a picture is worth a thousand words, unmanned aircraft system (UAS) MI in COIN operations is worth a million. When viewed by a trained analyst, it can answer many questions. MI provides support to operations and intelligence customers simultaneously. These dual roles and/or mission sets for exploiting UAS MI are driven by the current COIN conflicts that require speed and agility of action to combat fleeting adversaries. Tactical-level combat elements make decisions based on actionable information provided by near-real-time MI. At the same time, the intelligence customer can analyze and exploit UAS MI for trends, pattern-of-life, or other supporting efforts.

PROBLEM

The lack of joint MI exploitation training standards ultimately reduces the value of the MI information to the warfighter. A bold statement, yet each Service (and most units within the Services) has its own ways of exploiting and archiving MI and has limited, if any, commonality in training its imagery analysts.

Further adding to the inconsistencies in MI tactics, techniques, and procedures (TTP), the Services differ in collection methods and operational procedures. For instance, an Army UAS payload sensor operator is expected to make "call-outs"[2] during ongoing operations even though they may not be a trained MI analyst; however, USAF pilots, sensor operators, and mission coordinators are currently prohibited from making call-outs according to USAF tactics, techniques and procedures. These two examples indicate that although the Service triad of provider, exploiter, and customer may be close together or thousands of miles apart, distance to provide support is not the factor: consistent standards for use across the Services is the factor.

USAF Chief of Staff Gen Norton Schwartz speaks about career field reorganization to Airmen of the 447th Air Expeditionary Group at Sather Air Base, Iraq. In the past, all UA pilots were reassigned from other aircraft. (Photo by SSgt Paul Villanueva II, USAF)

In 2008, USJFCOM's Joint Unmanned Aircraft Systems Center of Excellence (JUAS COE) conducted several studies that identified gaps in MI training within and among the different Service schoolhouses. The focus of the JUAS COE studies was to address the qualitative problem (lack of standards) rather than the quantitative problem (lack of trained analysts). Establishing common standards would provide the baseline

foundation for development of joint doctrine and ensure analysts are trained to better function in a joint environment. Furthermore, using these standards would be a large step forward to support an ever-growing requirement. "The Air Force over the last year has more than doubled the number of round-the-clock [unmanned aerial vehicle] UAV orbits over Iraq and Afghanistan—from 12 to 27—and has had to rapidly train pilots to keep up with the pace. Air Force officials say they want to increase that total to 50 orbits by 2011. For each orbit, though, about six intelligence Airmen are needed to analyze the full motion video (FMV)[3] piped back. Those Airmen then produce intelligence products—such as maps showing houses visited by targeted insurgents or where certain vehicles stopped—and ship them to ground commanders in theater. The number of Air Force National Guard and Reserve Airmen analyzing unmanned aircraft feeds at distributed common ground systems has quadrupled, and Col Jon Kimminau, vice-commander of the [Air Force] ISR Agency said the Service will need to add 2,000 active-duty Airmen by 2011 to monitor those 50 [Predator] orbits." [4]

An MQ-9 Reaper views a SCUD ballistic missile launcher. (USAF photo)

APPROACH

The above issues are not going unnoticed, but solutions have been slow in coming. DOD Instruction 3305.10, *DOD Geospatial Intelligence Training* (22 Dec 06), directed the establishment of geospatial intelligence (GEOINT) analyst training standards, but these joint standards have yet to be formally developed. Addressing this DOD and intelligence community (IC)-wide problem, the National System for Geospatial Intelligence (NSG) moved forward to develop MI training criteria under the auspices of its Community Geospatial Intelligence Training Council (CGTC).

In September 2008, the CGTC established an MI Working Group (MIWG) of the Service IC and ally members (i.e., United Kingdom and Canada) focusing on similar work with the primary task of developing an MI competency terminology list with supporting skill-level tasks. In November 2008, the JUAS COE began conducting parallel studies focusing on MI analyst training competencies and on MI exploitation processes.

As the JUAS COE began work, the mutual efforts ongoing by the CGTC's MIWG were identified, and the JUAS COE partnered with them to support accelerated action. Quickly, the mutual efforts of the CGTC's MIWG and the JUAS COE were identified and the two entered into a partnership. As the JUAS COE gained expanded awareness and insight from the MIWG's members, the MIWG gained JUAS COE assistance in reviewing classified and unclassified supporting documents from the Services, US Special Operations Command (USSOCOM), and the Department of Homeland Security.

This effort further identified best practices and the overall lack of a common standard for MI exploitation, as well as an inconsistent set of MI training within the Services. In particular, the JUAS COE learned that USSOCOM had developed FMV exploitation standards and timelines in 2006. These standards and time-

"The Air Force over the last year has more than doubled the number of round-the-clock [unmanned aerial vehicle] UAV orbits over Iraq and Afghanistan — from 12 to 27 — and has had to rapidly train pilots to keep up with the pace."

lines provided a reference for JUAS COE development of exploitation report worksheets, as well as contributing to revamping the MIWG FMV exploitation phase definitions.

The result of the collaboration was standardization of the training of MI analysts and their products focused on: (1) skill-level tasks supporting MI competency, (2) phases of MI exploitation with definitions which take into account time and space factors, setting MI apart from traditional still imagery, and (3) a set of standardized reporting formats that will eventually become joint standards for training TTP.

US Army Staff Sgt Adam Jeter launches a Raven unmanned aircraft during a joint air assault operation east of Baghdad, Iraq. The Raven is being used to provide real time observation of the objective during a search for weapons caches and insurgent activity. (Photo by SSgt James Selesnick, USA)

RESULTS

To date, the MI competency terminology list, and its supporting tasks, is under review in NGA for incorporation into the larger imagery analyst core competency list.

Prior to December 2008, there were no definitions for the phases of exploitation for MI, and there was no standard for analyst exploitation reporting for later use using a common format. An MI competency terminology list with supporting skill-level tasks was just in its infancy. As a result of the combined efforts of National Geospatial Intelligence Agency (NGA), MIWG, and the JUAS COE, the FMV phases of exploitation emerged in January 2009 (see tables 1 and 2) as did the refinement of the MI competency.

Finally, the JUAS COE utilized the USSOCOM standards and timelines for MI exploitation to develop exploitation reporting worksheet formats. The worksheets are designed as a potential common standard for eventual use by the NGA, Service schoolhouse curricula, and in future operations. By combining a common approach framework in formatting to detail mission information, target metadata, and related information, the worksheets can provide a common standard over the various non-standard (for reporting, archiving, etc.) reporting formats currently in use.

In March, the exploitation definitions and competency terminology list were presented to the CGTC, consisting of representatives from all of the combatant commands, uniformed Services, allies, and much of the IC, which approved the proposals. The CGTC recommended forwarding the proposal through the NGA to the Office of the Director, National Intelligence, for approval. In April, the JUAS COE hosted the NGA MI Tradecraft Working Group at Nellis Air Force Base, Nevada, where further refinement of the MI competency terminology list occurred.

To date, the MI competency terminology list, and its supporting tasks, is under review in NGA for incorporation into the larger imagery analyst core competency list. As this effort within NGA continues, the JUAS COE continues its support by providing the MIWG co-chair while reviewing continuously emerging Service UAS MI exploitation related TTP and concepts.

By developing quantified MI exploitation phase definitions and competency input, along with analyst training worksheets, the JUAS COE and the NGA can bring a measure of modernization to the exploitation of MI analysis. While the efforts noted above may not be the 100% solution, they are designed to meet an urgent need in the current fight.

END NOTE

[1] Noonan, Michael. "Defense Showstoppers: National Security Challenges for the Obama Administration: A Conference Report—Keynote Address [by GEN James Mattis]: Joint Warfare in the 21st Century." Philadelphia, PA: Foreign Policy Research Institute, 12 Feb 09, accessed 28 Apr 09; available from http://www.fpri.org/enotes/200903.noonan.defenseshowstoppers.html; Internet.

[2] The term "call-out" is defined as "Communicating relevant observations to your customers (example: report similar to a SALT-W report [Size, Activity, Location, Time, What next]);" draft definition developed during the Apr 09 NGA Motion Imagery Tradecraft Working Group.

[3] For the purposes of this article, FMV is interchangeable with the acronym MI.

[4] Hoffman, Michael. "More ISR Intel Analyst Needed." Military Times, 19 August 08, accessed 4 February 2009; available from http://militarytimes.com/forums/showthread.php?t=1567882; Internet.

FMV Exploitation Phase Definitions	Mar 09, CGTC Consensus
Rapid, near-real-time call-outs of FMV via voice or chat	Phase I
Initial FMV annotated stills and video can supplement Phase I	Phase II
In-depth analysis of FMV data, possibly fused with other sources, resulting in an intelligence product	Phase III

Table 1. FMV Exploitation Phase Definitions

FMV Phases	Producer	Product
Phase I: Rapid/near-real-time call-outs	Exploitation or Sensor Operator Personnel (forward or reachback)	• Voice Reports • Chat
Phase II: Initial anotated stills and video (supplementary)	Processing, Exploitation, and Dissemination (PED) Crews (forward or reachback)	• Initial FMV Stills • Initial FMV Clips • Shape Files Based off of FMV Reports
Phase III: Detailed analysis Multi-intelligence fusion	• PED Crews • Fusion Cells • Interagency Partners	• Compiled Shape Files • Target Folders and Compiled Reports

Table 2. FMV Exploitation by Phase

Unmanned Aircraft System Integration into the National Airspace System

An MQ-1 Predator aircraft prepares for landing at Balad Air Base, Iraq, after a combat mission. (Photo by SrA Olufemi A. Owolabi, USAF)

By
Mr. Edward Odom

Unmanned Aircraft Systems—Unseen, unheard, unstoppable, and un-baseable!

Normally UASs are confined to restricted type airspace; i.e., restricted areas, warning areas, and prohibited areas.

Department of Defense (DOD) unmanned aircraft systems (UASs) by the thousands will eventually return from the global war on terror (GWOT) only to find no place to train. They are proving their worth in intelligence, surveillance, and reconnaissance (ISR) "gold" for the military so the demand is high and the numbers are growing daily to meet demands. Ranging in size from small hand-held micro-size to high-flying, long endurance, jet powered behemoths with the wingspans near that of a Boeing 727, UASs are deployed and flying daily to support our troops abroad. They're also flying in the US for testing, pilot training, and proficiency.

Unfortunately, technology and numbers have far surpassed the Federal Aviation Administration's (FAA) ability to facilitate training areas in our country's National Airspace System (NAS). Normally UASs are confined to restricted type airspace; i.e., restricted areas, warning areas, and prohibited areas. Restricted airspace is generally associated with air-to-ground range activity or hazardous flying activities and is in short supply. Outside those areas proponents are required to apply for an FAA Certificate of Authorization (COA) or waiver.

In accordance with FAA order JO 7610.4M, COA applicants must mitigate the lack of see-and-avoid (SAA) to fly. Some of the means of mitigation are forward/side looking cameras, chase planes, ground/air observers, and radar traffic monitor-

ing using primary radar or "skin" paints. The more mitigation(s) used the better when making a case. Expect about 60 days minimum for the FAA to evaluate a COA request and, if deemed safe, a COA will be issued for up to 1 year. Take it from experience though, it is a long and arduous process. So…why don't we just build more restricted airspace?

Two Marines prepare to launch a Dragon Eye, the Marine variant of the Naval Research Laboratory's Advanced Tactical Recce (ATR) UA. (USMC photo)

Unfortunately, neither the FAA nor the DOD has determined UAS flight, in itself, as a hazardous activity. As stated earlier, restricted areas are for hazardous activities, therefore UAS flight training alone will not justify building new restricted airspace. Throw bombs or lasers on a UAS and you may have a case for restricted airspace, but developing restrictive airspaces falls under rulemaking actions; it is a 3-5 year process with environmental costs running into the millions of dollars. With all of the competing interests in the NAS coupled with the strong opposition by the general flying public to add more restrictions in the NAS, there is a high probability of failure when proposing new restricted airspace. Airline Owners and Pilots Association (AOPA), with nearly a half million members, and the Airline Pilots Association are the strongest lobbyists against further restrictions in the NAS. The consensus is that the DOD has enough airspace for training in the US. In general, we do have enough airspace for training, but only a small percentage of it is comprised of restricted areas where UASs are currently and generally confined. Sounds much like a "Catch-22" doesn't it?

The issue is much more complex than everyone initially thought. All Codes of Federal Regulations (CFRs) and Federal Air Regulations (FARs) are written for manned aircraft with absolutely no consideration for unmanned aircraft flying in the NAS. Remotely piloted aircraft "hobbyists" have been around for quite some time, but not considered a problem since they fly well below general and commercial aviation. Also, the oldest and most widely used method of collision avoidance, SAA, is negated in nearly all UAS flying today. The swift proliferation of UAS and the need for airspace access have opened the eyes, so-to-speak, of aviators around the world. There is a mad rush in the civil and military worlds to compensate for this absence of "eyes on board" in the current and future UAS with a "sense-and-avoid" system. Air Force Research Laboratory (AFRL) is leading the DOD effort, but the solution is also more complex than "meets the eye." How do you quantify what the "MARK-1" eyeball can see? Depends on who's looking, right? Well, the FAA is the one looking and they are looking to the DOD to recommend a standard. Is one eye as good as the other? Do we meet the lowest standard of eyesight needed for a Class III flying physical for student / private pilots or build something that can see 20/20? Maybe we should shoot for something that far exceeds man's eyesight. Those decisions are limited by our current technology and still need to be spelled out. The latest estimate for a full blown SAA solution is 2018-2020. In the mean time, joint efforts may provide an interim solution in the next few years. Why the rush you say? We have thousands of UASs in the DOD

The swift proliferation of UAS and the need for airspace access have opened the eyes, so-to-speak, of aviators around the world.

inventory with more coming off the assembly line daily. We need to train pilots now and don't have enough restricted airspace in the NAS to do it and the demand for UAS ISR is great.

ISR has become more vital to the military Services than ever and the call for more is deafening. It's the new "drug" for the Services and their appetite is both ravenous and insatiable. The more we get, the more we want; from the Secretary of Defense down to the boots-on-the-ground Soldier, the need for the 'fix" is loud and clear; more ISR! The preponderance of information coming from those small drones buzzing above the area of responsibility and from the high-flying, near space, vehicles on the covers of *Popular Mechanics*, *Air and Space Technology*, and *Science Illustrated*, is focused on finding the bad guys. Real and near real time information for a society hooked on immediate need, immediate satisfaction is now available to nearly every facet of America's armed forces at home and abroad. Oh, and it's not just our nation's military that has this ISR addiction.

Any data gathering entity needing ISR or the capability for massive overland information collection all want to use UASs and they're getting them.

Soldiers assigned to the 4th Special Troops Battalion, 4th Brigade Combat Team, 1st Cavalry Division's Unmanned Aerial System Platoon move to a UAS launch and recovery site on Forward Operating Base Hunter, Iraq recently. (Photo by 1 LT Joanne Cotton, USA)

The Department of Homeland Security, Customs and Border Protection, the Federal Bureau of Investigation, federal, state, and local police—everyone looking for bad guys—all want ISR. Nor are we just looking for bad guys or criminal activity. The National Aeronautics and Space Administration, Department of the Interior, Forestry and Fish and Wildlife Services are looking for hurricanes, holes in the ozone, climate changes, global warming, forest fires, etc. The list for sustained, 24/7/365 observation is long and getting longer. Any data gathering entity needing ISR or the capability for massive overland information collection all want to use UASs and they're getting them. They also must have a place to train.

So we're back to square one. We have too many unmanned aircraft and not enough segregated airspace to fly them in. Our military men and women will slowly begin coming home from theatre soon and bringing with them thousands more UASs and looking for places to fly.

Fortunately, we're already in the trenches with the FAA searching for places and innovative ways to fit UASs into America's already congested skies. We've been fighting the battles for over a decade now and have made slow, but steady, progress in getting those obscure, unmanned, freaks of aviation on the front lines of progress. These include Global Hawk, Broad Area Maritime Surveillance (BAMS), Reaper, Predator B, Predator, Sky Warrior, Hunter, FireScout, Pioneer, Shadow, Scan Eagle, Dragon Eye, and Raven just to name a few. Obscure maybe, for now; but get familiar with the names. Not because they're coming, these are already here and with many more coming. This, folks, is just the tip of the spear; the leading edge of the future of aviation.

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AIRFIELD OPENING *Multi-Service Tactics, Techniques, and Procedures for Airfield Opening* **Distribution Restricted**	15 May 07	FM 3-17.2 NTTP 3-02.18 AFTTP 3-2.68	Description: A quick-reference guide to opening an airfield in accordance with MTTP. Contains planning considerations, airfield layout, and logistical requirements for opening an airfield. Status: **Current**
CORDON AND SEARCH *Multi-Service Tactics, Techniques, and Procedures for Cordon and Search Operations* **Distribution Restricted**	25 APR 06	FM 3-06.20 MCRP 3-31.4B NTTP 3-05.8 AFTTP 3-2.62	Description: Consolidates the Services' best TTP used in cordon and search operations. Provides MTTP for the planning and execution of cordon and search operations at the tactical level of war. Status: Assessment
EOD *Multi-Service Tactics, Techniques, and Procedures for Explosive Ordnance Disposal in a Joint Environment* **Approved for Public Release**	27 OCT 05	FM 4-30.16 MCRP 3-17.2C NTTP 3-02.5 AFTTP 3-2.32	Description: Provides guidance and procedures for the employment of a joint EOD force. It assists commanders and planners in understanding the EOD capabilities of each Service. Status: Assessment
MILITARY DECEPTION *Multi-Service Tactics, Techniques, and Procedures for Military Deception* **Classified SECRET**	12 APR 07	MCRP 3-40.4A NTTP 3-58.1 AFTTP 3-2.66	Description: Facilitate the integration, synchronization, planning, and execution of MILDEC operations. Servce as a "one stop" reference for service MILDEC planners to plan and execute multi-service MILDEC operations. Status: **Current**
NLW *Multi-Service Service Tactics, Techniques, and Procedures for the Tactical Employment of Nonlethal Weapons* **Approved for Public Release**	16 AUG 07	FM 3-22.40 MCWP 3-15.8 NTTP 3-07.3.2 AFTTP 3-2.45	Description: Supplements established doctrine and TTP providing reference material to assist commanders and staffs in planning/coordinating tactical operations. It incorporates the latest lessons learned from real world and training operations and examples of TTP from various sources. Status**: Current**
PEACE OPS *Multi-Service Tactics, Techniques, and Procedures for Conducting Peace Operations* **Approved for Public Release**	20 OCT 03 Change 1 incorporated 14 APR 09	FM 3-07.31 MCWP 3-33.8 AFTTP 3-2.40	Description: Provides tactical-level guidance to the warfighter for conducting peace operations. Status: **Current with Change 1**
TACTICAL CONVOY OPERATIONS *Multi-Service Tactics, Techniques, and Procedures for Tactical Convoy Operations* **Distribution Restricted**	13 JAN 09	FM 4-01.45 MCRP 4-11.3H NTTP 4-01.3 AFTTP 3-2.58	Description: Consolidates the Services' best TTP used in convoy operations into a single multi-Service TTP. Provides a quick reference guide for convoy commanders and subordinates on how to plan, train, and conduct tactical convoy operations in the contemporary operating environment. Status: **Current**
TECHINT *Multi-Service Tactics, Techniques, and Procedures for Technical Intelligence Operations* **Approved for Public Release**	9 JUN 06	FM 2-22.401 NTTP 2-01.4 AFTTP 3-2.63	Description: Provides a common set of MTTP for technical intelligence operations. Serves as a reference for Service technical intelligence planners and operators. Status: **Assessment**
UXO *Multi-Service Tactics, Techniques, and Procedures for Unexploded Explosive Ordnance Operations* **Approved for Public Release**	16 AUG 05	FM 3-100.38 MCRP 3-17.2B NTTP 3-02.4.1 AFTTP 3-2.12	Description: Describes hazards of UXO submunitions to land operations, addresses UXO planning considerations, and describes the architecture for reporting and tracking UXO during combat and post conflict. Status: **Assessment**

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TITLE	**DATE**	**PUB #**	**DESCRIPTION / STATUS**
BREVITY *Multi-Service Brevity Codes* **Distribution Restricted**	30 OCT 07	FM 1-02.1 MCRP 3-25B NTTP 6-02.1 AFTTP 3-2.5	Description: Defines multi-Service brevity which standardizes air-to-air, air-to-surface, surface-to-air, and surface-to-surface brevity code words in multi-Service operations. Status: **Revision**
CIVIL SUPPORT *Multi-Service Tactics, Techniques, and Procedures for Civil Support Operations* **Distribution Restricted**	3 DEC 07	FM 3-28.1 NTTP 3-57.2 AFTTP 3-2.67	Description: Fills the Civil Support Operations MTTP void and assists JTF commanders in organizing and employing Multi-Service Task Force support to civil authorities in response to domestic crisis. Status: **Current**
COMCAM *Multi-Service Tactics, Techniques, and Procedures for Joint Combat Camera Operations* **Approved for Public Release**	15 MAY 07	FM 3-55.12 MCRP 3-33.7A NTTP 3-13.12 AFTTP 3-2.41	Description: Fills the void that exists regarding combat camera doctrine and assists JTF commanders in structuring and employing combat camera assets as an effective operational planning tool. Status: **Current**
HAVE QUICK *Multi-Service Tactics, Techniques, and Procedures for HAVE QUICK Radios* **Distribution Restricted**	7 MAY 04	FM 6-02.771 MCRP 3-40.3F NTTP 6-02.7 AFTTP 3-2.49	Description: Simplifies planning and coordination of HAVE QUICK radio procedures. Provides operators information on multi-Service HAVE QUICK communication systems while conducting home station training or in preparation for interoperability training. Status: **Assessment**
HF-ALE *Multi-Service Tactics, Techniques, and Procedures for the High Frequency-Automatic Link Establishment (HF-ALE) Radios* **Distribution Restricted**	20 Nov 07	FM 6-02.74 MCRP 3-40.3E NTTP 6-02.6 AFTTP 3-2.48	Description: Standardizes high power and low power HF-ALE operations across the Services and enables joint forces to use HF radio as a supplement / alternative to overburdened SATCOM systems for over-the-horizon communications. Status: **Current**
IDM *Multi-Service Tactics, Techniques, and Procedures for the Improved Data Modem Integration* **Distribution Restricted**	30 MAY 03	FM 6-02.76 MCRP 3-25G NTTP 6-02.3 AFTTP 3-2.38	Description: Provides digital connectivity to a variety of attack and reconnaissance aircraft, facilitates exchange of near-real-time targeting data, and improves tactical situational awareness by providing a concise picture of the multi-dimensional battlefield. Status: **Assessment to rescind due to decreased relevance of material**
IFF *MTTP for Mark XII IFF Mode 4 Security Issues in a Joint Integrated Air Defense System* **Classified SECRET**	11 DEC 03	FM 3-01.61 MCWP 3-25.11 NTTP 6-02.2 AFTTP 3-2.39	Description: Educates the warfighter to security issues associated with using the Mark XII IFF Mode 4 Combat Identification System in a joint integrated air defense environment. Captures TTP that addresses those security issues. Status: **Rescinded.**
JATC *Multi-Service Procedures for Joint Air Traffic Control* **Distribution Restricted**	17 JUL 03	FM 3-52.3 MCRP 3-25A NTTP 3-56.3 AFTTP 3-2.23	Description: Provides guidance on ATC responsibilities, procedures, and employment in a joint environment. Discusses JATC employment and Service relationships for initial, transition, and sustained ATC operations across the spectrum of joint operations within the theater or AOR. Status: **Signature Draft**
JTF IM *Multi-Service Tactics, Techniques, and Procedures for Joint Task Force Information Management* **Distribution Restricted**	10 SEP 03	FM 6-02.85 (FM 101-4) MCRP 3-40.2A NTTP 3-13.1.16 AFTTP 3-2.22	Description: Describes how to manage, control, and protect information in a JTF headquarters conducting continuous operations. Status: **Assessment**
JTF LNO Integration *Multi-Service Tactics, Techniques, and Procedures for Joint Task Force (JTF) Liaison Officer Integration* **Distribution Restricted**	27 JAN 03 Retained in March 06	FM 5-01.12 (FM 90-41) MCRP 5-1.B NTTP 5-02 AFTTP 3-2.21	Description: Defines liaison functions and responsibilities associated with operating a JTF. Status: **Assessment to rescind. JP3-33 provides coverage of JTF LNO MTTP**

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TITLE	**DATE**	**PUB #**	**DESCRIPTION / STATUS**
REPROGRAMMING *Multi-Service Tactics, Techniques, and Procedures for the Reprogramming of Electronic Warfare and Target Sensing Systems* **Distribution Restricted**	22 JAN 07	FM 3-13.10 (FM 3-51.1) NTTP 3-51.2 AFTTP 3-2.7	Description: Supports the JTF staff in planning, coordinating, and executing reprogramming of electronic warfare and target sensing systems as part of joint force command and control warfare operations. Status: **Assessment**
TACTICAL RADIOS *Multi-Service Communications Procedures for Tactical Radios in a Joint Environment* **Approved for Public Release**	14 JUN 02	FM 6-02.72 MCRP 3-40.3A NTTP 6-02.2 AFTTP 3-2.18	Description: Standardizes joint operational procedures for SINCGARS and provides an overview of the multi-Service applications of EPLRS. Status: **Assessment**
UHF TACSAT/DAMA *Multi- Service Tactics, Techniques, and Procedures Package for Ultra High Frequency Tactical Satellite and Demand Assigned Multiple Access Operations* **Approved for Public Release**	31 AUG 04	FM 6-02.90 MCRP 3-40.3G NTTP 6-02.9 AFTTP 3-2.53	Description: Documents TTP that will improve efficiency at the planner and user levels. (Recent operations at JTF level have demonstrated difficulties in managing limited number of UHF TACSAT frequencies.) Status: **Assessment**

NEW PROJECTS

AIR BRANCH – POC alsaa@langley.af.mil		
TITLE	**SERVICE**	**DESCRIPTION / STATUS**
None		
LAND AND SEA BRANCH – POC alsab@langley.af.mil		
CFSOF I&I *Multi-Service Tactics, Techniques, and Procedures for Conventional Forces and Special Operations Forces Integration and Interoperability* **Distribution Restricted**	USA USMC USN USAF USSOCOM	Description: This publication assists in planning and executing operations where conventional forces and special operations forces (CF/SOF) occupy the same operational environment. Status: **World Wide Review**
ADVISING *Multi-Service Tactics, Techniques, and Procedures for Advising Foreign Forces* **Distribution Restricted**	USA USMC USN USAF	Description: This publication will assist in the training of security force advisor teams. It serves as a reference to ensure coordinated multi-Service operations for planners and operators preparing for, and conducting, advisor team missions. Status: **Signature Draft**
MDO *Multi-Service Service Tactics, Techniques, and Procedures for Military Diving Operations* **Distribution Restricted**	USA USMC USN USAF	Description: This MTTP publication describes US Military dive mission areas (DMA) as well as the force structure, equipment, and primary missions that each Service could provide to a JTF Commander. Status**: Program Development**
COMMAND AND CONTROL (C2) BRANCH – POC alsac2@langley.af.mil		
TACTICAL CHAT *Multi-Service Tactics, Techniques, and Procedures for Internet Relay Chat for Command and Control* **Distribution Restricted**	USA USMC USN USAF	Description: This publication provides multi-Service tactics, techniques, and procedures (MTTP) to standardize and regulate the use of IRC for command and control (C2). Thus, it provides commanders and their units with guidelines to facilitate coordination and integration of IRC C2 when directing multi-Service and joint force operations. Status: **Signature Draft**
AIRSPACE CONTROL *Multi-Service Tactics, Techniques, and Procedures for Airspace Control* **Distribution Restricted**	USA USAF	Description: This MTTP publication is a tactical level document, which will synchronize and integrate airspace command and control functions and serve as a single source reference for planners and commanders at all levels Status: **Signature Draft**

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- **Combat Camera Operations (COMCAM)** — 15 May 07
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- **Improved Data Modem Integration (IDM)** — 30 May 03
- **Joint Air Traffic Control (JATC)** — 17 Jul 03
- **Joint Task Force Information Management (JTF-IM)** — 10 Sep 03
- **Joint Task Force Liaison Officer Integration (JTF LNO)** — 27 Jan 03
- **Reprogramming of Electronic Warfare and Target Sensing (Reprogramming)** — 22 Jan 07
- **Tactical Radios** — 14 Jun 02
- **Ultra High Frequency Tactical Satellite and Demand Assigned Multiple Access Operations (UHF TACSAT/DAMA)** — 31 Aug 04

Rescinded Pubs

Air Defense of the United States (ADUS) - 22 Mar 04. Rescinded 5 May 08.

Joint Operations Center and Army Air and Missile Defense Command Coordination (JAOC/AAMDC) - 22 Mar 04. Rescinded 10 Apr 08.

Joint Theater Missile Target Development (JTMTD) - 11 Nov 03. Rescinded 16 Jan 08.

Risk Management - 15 Feb 01. Rescinded 18 Aug 08.

MTTP for Mark XII IFF Mode 4 Security Issues in a Joint Integrated Air Defense System - 11 Dec 03. Rescinded 6 August 09

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